FACTS AND FIGURES

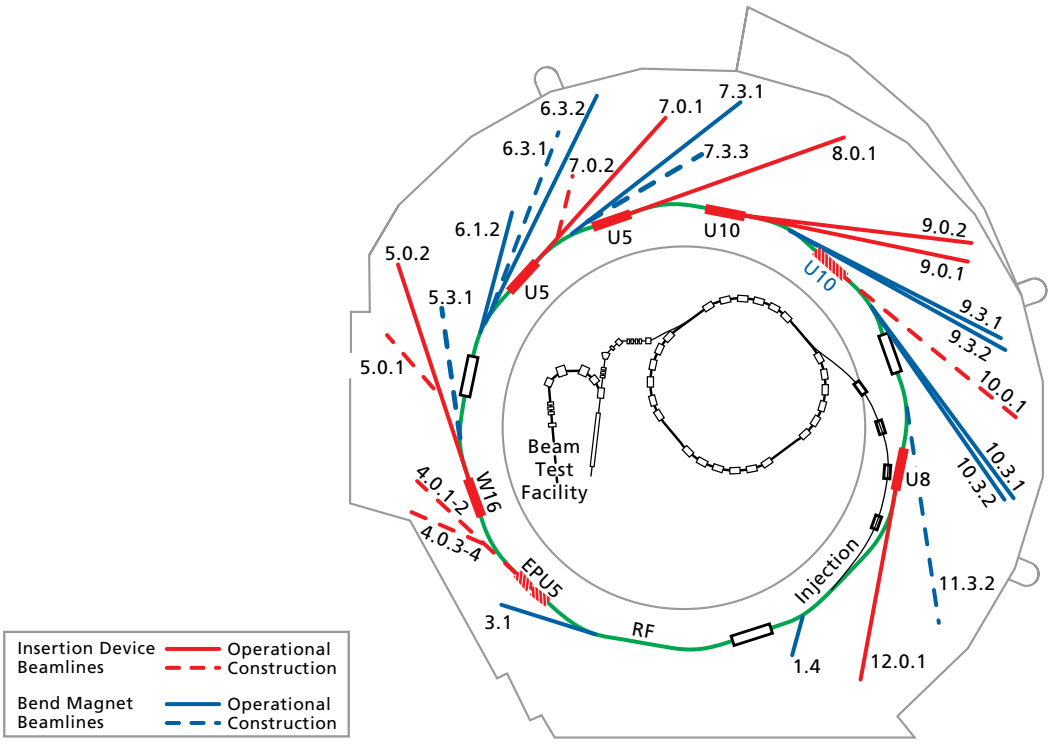
Using the Advanced Light Source

The ALS, a Department of Energy national user facility, welcomes researchers from universities, industry, and government laboratories. Qualified users have access either as members of participating research teams (PRTs) or as independent investigators. PRTs (groups of researchers with related interests from one or more institutions) construct and operate beamlines and have primary responsibility for experiment endstation equipment. They are entitled to a certain percentage of their beamline's operating time according to the resources contributed by the PRT. Through a proposal process, the remaining beamtime is granted to independent investigators, who may provide their own endstation or negotiate access to a PRT-owned endstation.

The ALS does not charge users for beam access if their research is non-proprietary. Users performing proprietary research are charged a fee based on cost recovery for ALS usage. All users are responsible for the day-to-day costs of research (e.g., supplies, phone calls, technical support).

The ALS storage ring is designed to run at energies within the range from 1.0 GeV to 1.9 GeV, allowing flexibility for user operations. The normal maximum operating current is 400 mA in multibunch operation. The spectral range of undulator and wiggler beamlines extends from photon energies of roughly 5 eV to 10 keV. Bend magnets produce radiation from the infrared to about 12 keV.

The ALS is capable of accommodating approximately 46 beamlines and more than 100 endstations. The first user beamlines began operation in October 1993, and there were 18 operating beamlines with several more under construction by the summer of 1997.



Beamlines 1997–1998*

(Information as of September 1997. Current Information is here)

Beamline	Source	Areas of Research	Energy Range	Monochromator	Available
BTF	ALS linac	Beam Test Facility	50 MeV electrons	None	Now
1.4	Bend magnet	Infrared spectromicroscopy, surface science, pump-probe experiments	0.05–1 eV	FTIR	Now
3.1	Bend magnet	Diagnostic beamline	200–280 eV	Mirror/filter	Now
4.0.1-2	EPU5 elliptical polarization undulator(s)	Magnetic spectroscopy	100–2000 eV	PGM	1998
4.0.3-4		Magnetic microscopy	100–1600 eV	SGM	1998
5.0.1	W16 wiggler	Monochromatic protein crystallography	7–14 keV	Curved crystal	1998
5.0.2	W16 wiggler	Multiple-wavelength (MAD) and monochromatic protein crystallography	3.5–14 keV	Double crystal	Now
5.3.1	Bend magnet	Scanning transmission x-ray microscopy	250–750 eV	SGM	1998
6.1.2	Bend magnet	High-resolution zone-plate microscopy	500–800 eV	Zone plate linear	Now
6.3.1	Bend magnet	Calibration and standards, EUV/soft x-ray optics testing, solid-state chemistry	100–2000 eV	VLS-PGM	1998
6.3.2	Bend magnet	Calibration and standards; EUV optics testing; atomic, molecular, and materials science	50–1300 eV	VLS-PGM	Now
7.0.1	U5 undulator	Surface and materials science, spectromicroscopy, spin resolution, photon-polarization dichroism	60–1000 eV	SGM	Now
7.0.2	U5 undulator	Coherent optics experiments	200–650 eV	None	1997
7.3.1.1	Bend magnet	Magnetic spectromicroscopy	260–1500 eV	SGM	1997
7.3.1.2	Bend magnet	Surface and materials science, micro x-ray photoelectron spectroscopy	260–1500 eV	SGM	Now
7.3.3	Bend magnet	Materials science, x-ray microdiffraction, x-ray absorption spectroscopy, sub-picosecond time-resolved x-ray diffraction, deep-etch x-ray lithography (LIGA)	3–12 keV	White light, four crystal	1997
8.0.1	U5 undulator	Surface and materials science, spectromicroscopy, imaging photoelectron spectroscopy	60–1000 eV	SGM	Now
9.0.1	U10 undulator	Atomic, molecular, and optical physics; high-resolution gas-phase spectroscopy**	20–320 eV	SGM	Now
9.0.2.1	U10 undulator	Chemical reaction dynamics, photochemistry	5–30 eV	None	Now
9.0.2.2	U10 undulator	High-resolution photoelectron and photoionization spectroscopy	5–30 eV	Off-plane Eagle	Now
9.3.1	Bend magnet	Atomic, molecular, and materials science	2.2–6 keV	Double crystal	Now
9.3.2	Bend magnet	Chemical and materials science, circular dichroism, spin resolution	30–1500 eV	SGM	Now
10.0.1**	U10 undulator	High-resolution atomic, molecular, and optical physics; photoemission of highly correlated materials	20–320 eV	SGM	1998
10.3.1	Bend magnet	X-ray fluorescence microprobe	3–20 keV	White light, multilayer	Now
10.3.2	Bend magnet	X-ray optics development, materials science	3–12 keV	White light, four crystal	Now
11.3.2	Bend magnet	EUV lithography	50–1300 eV	VLS-PGM	1998
12.0.1.1	U8 undulator	Surface and materials science, spectromicroscopy	60–320 eV	VLS-PGM	Now
12.0.1.2	U8 undulator	EUV lithography optics testing, interferometry	60–320 eV	VLS-PGM	Now

*The most current information on ALS beamlines is available on the World Wide Web (http://www-als.lbl.gov/als/als_users_bl/bl_table.html).
**The atomic and molecular science beamline will move to 10.0.1 in early 1998.

ALS Storage Ring Parameters

Parameter	Value
Beam particle	Electron
Beam energy	1.0–1.9 GeV
Injection energy	1.0–1.5 GeV
Beam current multibunch mode two-bunch mode	 400 mA 2 × 20 mA
Filling pattern (multibunch mode)	287 bunches
Bunch spacing multibunch mode two-bunch mode	 2 ns 328 ns
Circumference	196.8 m
Number of straight sections	12
Radio frequency	500 MHz
Beam size in straight sections, rms	200 μm horiz. × 20 μm vert.
Natural emittance	3.5 nm-rad
Energy spread ($\Delta E/E$, rms)	8×10^{-4}

Parameter	Value at 1.5 GeV	Value at 1.9 GeV
Beam lifetime multibunch mode* two-bunch mode	 ~5 hours at 400 mA ~2.5 hours at 40 mA	 ~4.5 hours at 400 mA ~2.5 hours at 40 mA
Horizontal emittance	4 nm-rad	6 nm-rad
Vertical emittance (nominal)**	< 0.1 nm-rad	< 0.1 nm-rad

*Fills in multibunch mode typically occur every four hours for the convenience of our users.
**Vertical emittance can be deliberately increased to improve beam lifetime.

Insertion Devices for 1997–1998

Device	Beamline	Status	Energy Range (at 1.5 GeV)	Energy Range (at 1.9 GeV)	Period Length	Number of Periods	Operating Gap Range	Peak Effective Field Range
U5 Undulator	8.0	Operational	50–1900 eV	80–3000 eV	5.0 cm	89	1.4–4.5 cm	0.85–0.10 T
U5 Undulator	7.0	Operational	50–1900 eV	80–3000 eV	5.0 cm	89	1.4–4.5 cm	0.85–0.10 T
U8 Undulator	12.0	Operational	18–1200 eV	30–1900 eV	8.0 cm	55	2.5–8.3 cm	0.80–0.07 T
U10 Undulator	9.0	Operational	5–950 eV	8–1500 eV	10.0 cm	43	2.4–11.6 cm	0.98–0.05 T
U10 Undulator	10.0	Construction in Progress	8–950 eV	12–1500 eV	10.0 cm	43	2.4–11.6 cm	0.80–0.05 T
EPU5 Elliptical Polarization Undulator	4.0	Design and Construction in Progress	60–1000 eV*	100–1500 eV*	5.0 cm	37	1.45–5.5 cm	0.79–0.10 T (vertical field) 0.54–0.10 T (horizontal field)
W16 Wiggler	5.0	Operational	5–13 keV	5–21 keV	16.0 cm	19	1.4–18.0 cm	2.1–0.03 T

*Elliptical polarization mode.